传播的人群生态动力学模型

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摘要　　研究了HIV传播的动力学模型，描述了流行性传染病区域的人群传播规律，特别是利用摄动理论对艾滋病的传播动力学非线性方程作了定量、定性的讨论。

Bionomics dynamic model of human groups for HIV transmission

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Abstract　The studies on the epidemic contagion transmission are of high value and have received an adequate attention at all times. Especially, the transmission of HIV virus has attached more importance to scientists. There is grievous calamity to human. It brings severe menace. On the study of the transmission for HIV virus, an original research adopts only some simple observational and statistical data to obtain the conclusion. But it can not validly reflect its essence of the transmission. Recently, the research method of dynamics is produced for the study of HIV's transmission in international academic circles, i. e. the people first reduce it to the differential equation of model, which reflect its essential phenomenon and then solve the solution of the corresponding equation with the mathematic methods; finally, study its dynamic rules upon the theory of biology, medicine and mathematics. This paper deals with the study of the HIV's transmission for a corresponding nonlinear dynamic model by using the modern mathematic perturbation theory. Lately, the nonlinear perturbed problem has been widely investigated in the international academic circles. Many scholars have considered the approximate theory. Approximate methods have been developed and refined, including the average method, boundary layer method, matched asymptotic expansion method and multiple scales method. In this paper, a perturbed method, being simple and valid, is applied to study the epidemic contagion transmission. The author first establishes a model of the epidemic contagion transmission, which is a system of differential equation, and has developed the undetermined functions in power series as small positive parameter. Then the equations of the coefficients for power series are obtained. Their solutions are solved. Thus, the conclusion is that a good approximate for the original model comes to a solution, which is an analytic expression, and can keep on analytic operation.

Key words　HIV　transmission；AIDS；nonlinear；perturbation

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